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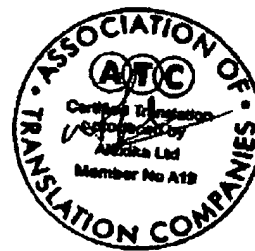
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Surface water drainage system

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## DESCRIPTION

The invention relates to a surface water drainage system, in particular a drainage channel, according to the precharacterizing clause of Claim 1.

- 15 A surface water drainage system of this kind is known, for example, from the documents CH 681 313 or DE 195 11 788 A1.

The problems generally encountered with such drainage systems, in particular drainage channels, are associated with the fact that on one hand the cover lying on the structure installed in  
20 the ground must be fixed in position so firmly that even the impulse-like forces encountered when a vehicle travels over the covers cannot release them. On the other hand, the covers must be opened at regular intervals so that cleaning and maintenance work can be done.

- 25 In the above-mentioned known surface water drainage systems a latch is attached to the undersurface of the cover, which bridges the cross section of the cover and/or the drainage channel equipped with said latch, and by way of lateral projections locks into undercut areas or recesses which are  
30 provided in the channel body.

The structure of the known systems is relatively costly.

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It is the objective of the invention to develop a surface water drainage system of the kind cited at the outset further, in such a way that manufacture and assembly are simplified while still ensuring at least equal durability and reliability of  
5 fixation.

This objective is achieved by a surface water drainage system according to Claim 1.

It is an essential point of the invention that the locking means associated with the cover are constructed as elastic hook  
10 elements and are attached to the edges of the cover. This measure results in a considerable saving of material, because it eliminates regions of the latches provided in the known arrangements that are superfluous with respect to the actual purpose of fixation, being situated in the middle regions of  
15 the cover. An additional result is an increase in both durability and fixation performance. That is, whereas in the known systems releasing the snap engagement at one side of the latch or releasing the latch from the grid causes the entire cover no longer to be retained on the structure installed in  
20 the ground, in the arrangement according to the invention the locking means on the two sides, i.e. at the edges of the cover, are independent of one another. If one of the locking means is released, the other remains in place unaltered and can continue to perform its fixation function.

25 The objective cited above is thus achieved by a surface water drainage system, in particular a drainage channel, comprising a structure that can be installed in the ground, a cover that can be laid onto an upper edge of said structure, and fixation devices that are fixed to the cover and comprise first locking  
30 means that can be brought into snap-on engagement with second locking means disposed on the installed structure to hold the cover onto said structure, in that the first locking means comprise elastic hook elements fixed to the edges of the cover.

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Preferably the first locking means are detachably fixed to the cover. This makes it possible to exchange these locking means (individually) in case they exhibit material fatigue and/or are damaged in other ways.

- 5 Exchanging of the locking means is facilitated by the fact that they are preferably fixed to the cover by a mechanism that does not require use of a tool.

- 10 The first locking means preferably comprise fixation elements that can be deformed with less force when the first locking means are being fixed to the cover than when these first locking means are being removed from the cover. As a result, on one hand easy assembly is ensured (in the factory or during repair work), while on the other hand the fixation elements hold the locking means securely to the cover.

- 15 The first locking means are preferably inserted into undercuts or recesses at the edge of the cover. Thus production of the cover no longer requires the additional expenditure that is otherwise necessary for separate devices with which to attach the locking means.

- 20 The first locking means preferably comprise tensioning devices that brace the first locking means against the cover so as to ensure that the latter are fixed in position with no play. As a result, the cover is held to the structure installed in the ground so tightly that it does not rattle.

- 25 In a first preferred embodiment the first locking means are constructed as springs and by bending strips of material. This makes their manufacture relatively inexpensive. In this case the first locking means are preferably fixed to undercut regions in the cover by means of tabs bent outward from the strip of material. As a result, on one hand easy manufacture with unaltered consumption of material is ensured, while on the other hand the attachment between locking means and cover is
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extremely durable. Furthermore, in this embodiment the cover is provided in its undercut sections with stamped-out areas or similar offsets, which can be engaged by the said tabs in order to fix the locking means to the cover. The durability of this arrangement is very high, and the level of manufacturing resource required is low.

In a second preferred embodiment the first locking means are constructed as elastomer bodies. Such bodies can be easily and economically produced, especially by injection molding, and exhibit great durability, which is very important in particular in view of the aggressive environmental influences (water, road salt, dirt) encountered in this area of application.

Additional characteristics will be apparent from the subordinate claims.

In the following exemplary embodiments of the invention are described in greater detail with reference to drawings, wherein

Figure 1 shows a first embodiment of the invention, including cover, in front view,

Figure 2 is a perspective drawing of part of the structure in the direction indicated by the arrow II in Fig. 1,

Figure 3 shows a side view along the line III-III in Fig. 1,

Figure 4 shows a partial view in the direction of the line IV-IV in Fig. 1,

Figure 5 shows a side view of a locking device according to a further embodiment of the invention,

Figure 6 shows a cross section through a drainage channel that can be installed in the ground,

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Figure 7 shows a perspective view, from diagonally below, of a further embodiment of the invention with a cast-iron grating as cover,

5 Figure 8 shows a partial plan view of the arrangement according to Fig. 7,

Figure 9 shows a section along the line IX-IX in Fig. 8,

Figure 10 shows a perspective view of a locking device according to Fig. 7,

10 Figure 11 shows a side view of the locking device according to Fig. 10,

Figure 12 shows a view along the line XII-XII according to Fig. 11,

Figure 13 shows a view along the line XIII-XIII in Fig. 12,

15 In the following description, the same reference numerals are used for identical parts and parts with identical actions.

20 In the arrangement shown in Figures 1 to 4 the cover 20 has been shaped by bending sheet steel. The edges 21, 22 in this case form undercut sections 23, each of which has a U-shaped profile with a supporting rim 29 on its lower side. The cover 20 is laid into a drainage channel such as is shown in Figure 6, in such a way that the edges 21, 22 are apposed to inner surfaces of lateral folds 14, which are formed by frames 12 that are attached to or poured into the upper edges 11 of a structure 10 that can be installed in the ground. The frames 12 25 additionally form bearing surfaces 13 on which the cover 20 rests, by way of its supporting rims 29.

Within the undercut sections 23 hook elements 30 are disposed, to serve as first locking means. In the region where they are

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5 situated the contour (in cross section) of the hook elements 30 is identical to the contour of the undercut section, i.e. it is likewise U-shaped, so as to ensure that the hook elements 30 formed from a strip of material make contact over their entire surface.

Parts of the horizontal (in the assembled state) regions of the hook elements 30 are bent outward to form an upper tab 31 and a lower tab 32, which thus project beyond the otherwise planar upper and lower horizontal surfaces of the hook elements 30.

10 Corresponding to these tabs, stamped-out areas are provided in the edges 21 and 22, specifically on the surface 21 of the cover 20 and in the supporting rims 29, so that in the assembled state the tabs 31, 32, by way of their edges directed toward the interior of the channel, are firmly engaged with the

15 corresponding edges of the stamped-out areas 25, 26. To ensure that this engagement is maintained even if the cover is manufactured with relatively large tolerances, additional tabs are bent outward on the surfaces of the hook elements 30 that face toward the edges 21, 22; these act as tensioning tabs 33.

20 By pressing against the inner (vertical) surfaces of the undercut section 23, these tensioning tabs press the hook elements 30 on the interior side in the direction towards the interior of the channel.

Each hook element 30 comprises a nose 34, underneath which

25 there is an insertion slope 35 and above which there is an unlatching slope 36. Thus when a cover 20 with hook elements 30 mounted therein is set onto the body 10, at first the insertion slopes 35 slide along the inner edges of the frames 12 and bend the hook elements 30 inward. In the position in which the

30 supporting rims 29 come to rest on the bearing surfaces 13, the noses 34 are caught in notches 50 in the frames, which serve as second locking means. These notches 50 are formed in the frames 12 over the entire length of the latter, which enables particularly simple manufacture of the frames.

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The cover 20 is removed by simply pulling it upward, so that the unlatching slopes 36 slide along the inside edges of the frame 12 and bend the hook elements inward again.

5 In the embodiment of the hook element 30 shown in Figure 5 the same basic functions are provided as in the embodiment previously described. However, the spring is somewhat slimmer and uses up less material.

10 In the following a further embodiment of the invention is explained with reference to Figures 7 to 13. Here the cover 30 is a cast-iron grating constructed in the conventional way. At the edges of the grating recesses 24 are provided, into which can be inserted the first locking means 30, which in this case are designed as elastomer bodies (in particular, injection-molded). So that these can be fixed within the recesses 24 of  
15 the cover 20, the hook elements 30 on both edges are provided with guide slots 37, 38, which engage closely with corresponding guide lugs 28 disposed at the inner edges of the recesses 24. In addition catch elements (not shown) can be provided in order to ensure improved retention of the hook  
20 elements 30 in the recesses 24.

The hook elements 30 are dimensioned such that their surfaces 39 are flush with the surface 27 of the cover 20.

25 The remaining functional components of the hook element 30, namely the nose 34, the insertion slope 35 and the unlatching slope 36, correspond to those in the previously illustrated embodiment of the invention.

30 It is of course possible to replace the hook elements formed by bending strips of material, as explained with reference to Figures 1 to 6, by elastomer elements according to Figures 10 to 13. In particular, the tabs 31 to 33 can be formed as corresponding protrusions on the corresponding surfaces of the hook element 30. It is likewise possible in the case of a cast-



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iron grating to employ hook elements that are correspondingly shaped by bending strips of material.

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List of reference numerals

- 10. Structure
- 11. Upper edge
- 12. Frame
- 5 13. Bearing surface
- 14. Lateral fold
- 20. Cover
- 21. Edge
- 22. Edge
- 10 23. Undercut section
- 24. Recess
- 25. Stamped-out area
- 26. Stamped-out area
- 27. Surface
- 15 28. Guide nose
- 29. Supporting rim
- 30. Hook element / 1st locking means
- 31. Upper tab
- 32. Lower tab
- 20 33. Tensioning tab
- 34. Nose
- 35. Insertion slope
- 36. Unlatching slope
- 37. Guide slot
- 25 39. Surface
- 50. Notch / 2nd locking means

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ABSTRACT

- 5 Surface water drainage systems are known that comprise a structure that can be installed in the ground, and a cover that can be laid onto an upper edge of said structure. Fixation devices are provided that are attached to the cover and comprise first locking means that can be brought into snap-on  
10 engagement with second locking means on said structure in order to retain the cover on the structure. To simplify the arrangement it is proposed to construct the first locking means as elastic hook elements that can be fixed to edges of the cover. This measure ensures both simplicity of manufacture and  
15 a high degree of durability.

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## CLAIMS

- 5 1. Surface water drainage system, in particular drainage  
channel, comprising  
a structure (10) that can be installed in the ground,  
a cover (20) that can be laid onto an upper edge (11) of  
the structure (10),  
10 fixation devices that are attached to the cover (20) and  
comprise first locking means (30) that can be brought into  
snapping engagement with second locking means (50) on the  
structure (10) in order to retain the cover (20) on the  
structure (10),  
15 characterized in that that the first locking means comprise  
elastic hook elements (30) that are fixed to edges (21, 22)  
of the cover (20).
- 20 2. Surface water drainage system according to Claim 1,  
characterized in that the first locking means (30) are  
detachably fixed to the cover (20).
- 25 3. Surface water drainage system according to one of the  
preceding claims,  
characterized in that the first locking means (30) can be  
fixed to the cover (20) without the use of tools.
- 30 4. Surface water drainage system according to one of the  
preceding claims,  
characterized in that the first locking means (30) comprise  
fixation elements (31, 32) such that less force is required  
to change their shape while fixing the first locking means  
(30) to the cover (20) than while removing the first  
locking means (30) from the cover (20).

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5. Surface water drainage system according to one of the preceding claims,  
characterized in that the first locking means (30) are inserted into undercuts (23) or recess (24) at the edge of the cover (20).
6. Surface water drainage system according to one of the preceding claims,  
characterized in that the first locking means (30) comprise tensioning devices (33) that brace the first locking means (30) means against the cover (20) so as to ensure that the latter are fixed in position with no play.
7. Surface water drainage system according to one of the preceding claims,  
characterized in that the first locking means (30) are constructed as springs, preferably by bending strips of material.
8. Surface water drainage system according to Claim 7,  
characterized in that the first locking means (30) are fixed to undercut regions (23) in the cover (20) by means of the tabs (31,32) bent outward from the strips of material.
9. Surface water drainage system according to claim 8,  
characterized in that the cover (20) is provided in its undercut sections (23) with stamped-out areas (25,26) or similar offsets which can be engaged with the tabs (31,32).
10. Surface water drainage system according to one of the preceding claims,  
characterized in that the first locking means (30) are formed as elastomer bodies.